Remarks

Examiner Goudreau is thanked for the thorough Office Action.

In the Claims

Independent claims 21, 27 and 33 have been further amended to include the limitation that the waferless seasoning methods employ a bromine and/or chlorine containing etchant gas.

Claim Rejections

The Rejection Of Claims 2 To 5, 8 To 10, 13 To 15 and 17 To 34 Under 35 U.S.C. §112, Second Paragraph, as Being Indefinite for Failing to Particularly Point Out and Distinctly Claim the Subject Matter Which Applicant Regards as the Invention

The rejection of claims 2 to 5, 8 to 10, 13 to 15 and 17 to 34 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention is acknowledged.

Specifically, the Examiner states that:

I. the usage of bracketed letters or bracketed terms in claims 20, 21, 26, 27, 32 and 33 for reasons other than to delete subject matter from a claim or to refer to numerals in figures in the specification is incorrect, and should be deleted.

-- Applicants agree with the Examiner's position that *brackets* should not be used except to show amendments to claims, however claims 20, 21, 26, 27, 32 and 33 use *parentheses*, i.e. " (" and ") ", and not brackets, i.e. " [" and "] ", and therefore this rejection is not applicable.

II. the wording used in part 2 of claims 21, 27 and 33 is confusing and should be reworded. Applicant refers to both the etching step, and the seasoning step in part 2 of claims 21, 27 and 33 which makes it difficult for the examiner to ascertain if the gasses recited in this step are used in the etching step or if they are used in the seasoning step.

-- Applicants respectfully disagree with the Examiner's position. Claims 21, 27 and 33 each state that "wherein within the plasma etch method:" (1) a cleaned plasma reactor chamber is seasoned; (2) using the seasoned plasma reactor chamber, the first silicon layer is etched employing a series a parameters including stated gasses; and (3) the seasoned plasma reactor chamber is cleaned by removing the seasoning polymer layer therefrom. Applicants fail to see the confusion. Step (2) clearly discusses *only* the first silicon layer etch step parameters wherein the first

silicon layer is etched within a seasoned plasma reactor chamber seasoned in the previous step (1).

The Rejection Of Claims 2 To 5, 8 To 10, 13 To 15 and 17 To 34 Under 35 U.S.C. §103(a) as Being Unpatentable Over Soga (U.S. Patent No. 6,090,718)

The rejection of claims 2 to 5, 8 to 10, 13 to 15 and 17 to 34 under 35 U.S.C. §103(a) as being unpatentable over Soga (U.S. Patent No. 6,090,718) (the '718 Soga Patent) is acknowledged.

Independent claims 20, 21, 26, 27, 32 and 33 distinguish over Soga under §103(a) because, inter alia, each of these independent claims include the limitation that the waferless seasoning methods employ, inter alia, a bromine and/or chlorine containing etchant gas flow rate of from about 10 to 200 sccm; Soga, as the Examiner states, does not disclose this limitation nor does Soga address the importance of this limitation as the instant invention does at page 13, lines 3 to 20, i.e., for example, "a product substrate... is plasma etched ... while not damaging the product substrate ... employ[ing] ... (2) at least one of a bromine containing seasoning polymer layer forming gas and a chlorine containing seasoning polymer layer forming gas...". Soga does not solve the same problem solved by the instant invention and therefore would be no motivation to alter the Soga reference as suggested by the Examiner.

Further, the prior art lack a suggestion that the reference should be modified in a manner required to meet the claims; up to now those skilled in the art never appreciated the advantage of the invention, although it is inherent; and the Examiner has not presented a convincing line of reasoning as to why the claimed subject matter as a whole, including its differences over the prior art, would have been obvious.

Claims 2 to 5 and 17 to 19 and 22 depend from independent claim 21; claims 8 to 10, 23 to 25 and 28 depend from independent claim 27; and claims 13 to 15, 29 to 31 and 34 depend from independent claim 33; and are believed to distinguish over the combination for the reasons previously cited.

Therefore claims 2 to 5, 8 to 10, 13 to 15, and 17 to 34 are allowable and allowance is respectfully solicited.

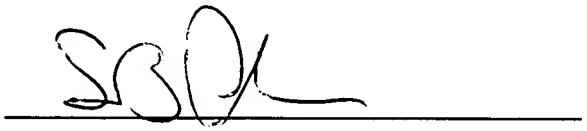
CONCLUSION

In conclusion, reconsideration and withdrawal of the rejections are respectively requested. Allowance of all claims is requested. Issuance of the application is requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

It is requested that the Examiner telephone Stephen G. Stanton, Esq. (#35,690) at (610) 296 – 5194 or the undersigned attorney at (845) 452 – 5863 if the Examiner has any questions or issues that may be resolved to expedite prosecution and place this Application in condition for Allowance.

Respectively submitted,



Stephen B. Ackerman

Reg. No. 37,761

Version with markings to show changes made.

21. (Twice amended) A method for forming an etched silicon layer comprising:

providing a first substrate having formed thereover a first silicon layer;

etching the first silicon layer to form an etched first silicon layer while employing a plasma etch method employing a plasma reactor chamber in conjunction with a plasma etchant gas composition which upon plasma activation provides at least one of an active bromine containing etchant species and an active chlorine containing etchant species, wherein within the plasma etch method:

(1) a cleaned plasma reactor chamber is seasoned to provide a seasoned plasma reactor chamber having a seasoning polymer layer formed therein; wherein the seasoning method is selected from the group consisting of dummy wafer seasoning methods, product wafer in-situ seasoning methods and waferless seasoning methods; wherein the waferless seasoning methods employ a bromine and/or chlorine containing etchant gas;

(2) the first silicon layer is etched to form the etched first silicon layer within the seasoned plasma reactor chamber; wherein the first silicon layer etch step, when using an eight inch diameter substrate, employs:

a reactor chamber pressure of from about 1 to 500 mTorr;

a radio frequency source power of from about 10 to 2000 watts at a source radio frequency of from about 2 to 13.56 MHz and an external bias power of up to about 500 watts;

a substrate temperature and a seasoned plasma reactor chamber temperature of from about 20 to 200°C;

a hydrogen bromide flow rate of from about 10 to 200 sccm;

an oxygen flow rate of from about 1 to 50 sccm;

a nitrogen trifluoride flow rate of from about 1 to 50 sccm;

a backside cooling gas pressure of from about 1 to 50 torr and a flow rate of from about 2 to 50 sccm; and

a magnetic field of up to about 200 gauss; and

(3) the seasoning polymer layer is cleaned from the seasoned plasma reactor chamber to provide the cleaned plasma reactor chamber after etching the first silicon layer to form the etched first silicon layer within the seasoned plasma reactor chamber prior to etching a second substrate having formed thereover a second silicon layer to form an etched second silicon layer formed over the second substrate within the plasma reactor chamber while employing the plasma etch method in accord with (1), (2) and (3).

27. (Twice amended) A method for forming an etched monocrystalline silicon layer comprising:

providing a first substrate having formed thereover a first monocrystalline silicon layer;

etching the first monocrystalline silicon layer to form an etched first monocrystalline silicon layer while employing a plasma etch method employing a plasma reactor chamber in conjunction with a plasma etchant gas composition which upon plasma activation provides at least one of an active bromine containing etchant species and an active chlorine containing etchant species, wherein within the plasma etch method:

(1) a cleaned plasma reactor chamber is seasoned to provide a seasoned plasma reactor chamber having a seasoning polymer layer formed therein; wherein the seasoning method is selected from the group consisting of dummy wafer seasoning methods, product wafer in-situ seasoning methods and waferless seasoning methods; wherein the waferless seasoning methods employ a bromine and/or chlorine containing etchant gas;

(2) the first monocrystalline silicon layer is etched to form the etched first monocrystalline silicon layer within the seasoned plasma reactor chamber; wherein the first monocrystalline silicon layer etch step, when using an eight inch diameter substrate, employs:

a reactor chamber pressure of from about 1 to 500 mTorr;

a radio frequency source power of from about 10 to 2000 watts at a source radio frequency of from about 2 to 13.56 MHz and an external bias power of up to about 500 watts;

a substrate temperature and a seasoned plasma reactor chamber temperature of from about 20 to 200°C;

a hydrogen bromide flow rate of from about 10 to 200 sccm;

an oxygen flow rate of from about 1 to 50 sccm;

a nitrogen trifluoride flow rate of from about 1 to 50 sccm;

a backside cooling gas pressure of from about 1 to 50 torr and a flow rate of from about 2 to 50 sccm; and

a magnetic field of up to about 200 gauss; and

(3) the seasoning polymer layer is cleaned from the seasoned plasma reactor chamber to provide the cleaned plasma reactor chamber after etching the first

monocrystalline silicon layer to form the etched first monocrystalline silicon layer within the seasoned plasma reactor chamber prior to etching a second substrate having formed thereover a second monocrystalline silicon layer to form an etched second monocrystalline silicon layer formed over the second substrate within the plasma reactor chamber while employing the plasma etch method in accord with (1), (2) and (3).

33. (Twice amended) A method for forming an etched polycrystalline silicon layer comprising:

providing a first substrate having formed thereover a first polycrystalline silicon layer;

etching the first polycrystalline silicon layer to form an etched first polycrystalline silicon layer while employing a plasma etch method employing a plasma reactor chamber in conjunction with a plasma etchant gas composition which upon plasma activation provides an active bromine containing etchant species, wherein within the plasma etch method:

(1) a cleaned plasma reactor chamber is seasoned to provide a seasoned plasma reactor chamber having a seasoning polymer layer formed therein; wherein the seasoning method is selected from the group consisting of dummy wafer seasoning methods, product wafer in-situ seasoning methods and waferless seasoning methods; <u>wherein the waferless seasoning methods employ a bromine and/or chlorine containing etchant gas;</u>

(2) the first polycrystalline silicon layer is etched to form the etched first polycrystalline silicon layer within the seasoned plasma reactor chamber; wherein

the first polycrystalline silicon layer etch step, when using an eight inch diameter substrate, employs:

a reactor chamber pressure of from about 1 to 500 mTorr;

a radio frequency source power of from about 10 to 2000 watts at a source radio frequency of from about 2 to 13.56 MHz and an external bias power of up to about 500 watts;

a substrate temperature and a seasoned plasma reactor chamber temperature of from about 20 to 200°C;

a hydrogen bromide flow rate of from about 10 to 200 sccm;

an oxygen flow rate of from about 1 to 50 sccm;

a nitrogen trifluoride flow rate of from about 1 to 50 sccm;

a backside cooling gas pressure of from about 1 to 50 torr and a flow rate of from about 2 to 50 sccm; and

a magnetic field of up to about 200 gauss; and

(3) the seasoning polymer layer is cleaned from the seasoned plasma reactor chamber to provide the cleaned plasma reactor chamber after etching the first polycrystalline silicon layer to form the etched first polycrystalline silicon layer within the seasoned plasma reactor chamber prior to etching a second substrate having formed thereover a second polycrystalline silicon layer to form an etched second polycrystalline silicon layer formed over the second substrate within the plasma reactor chamber while employing the plasma etch method in accord with (1), (2) and (3).